

Malware Analysis Report: "Dog.jpg"

Analysis Date: 15.08.2023

Report Author: Michał Botuliński

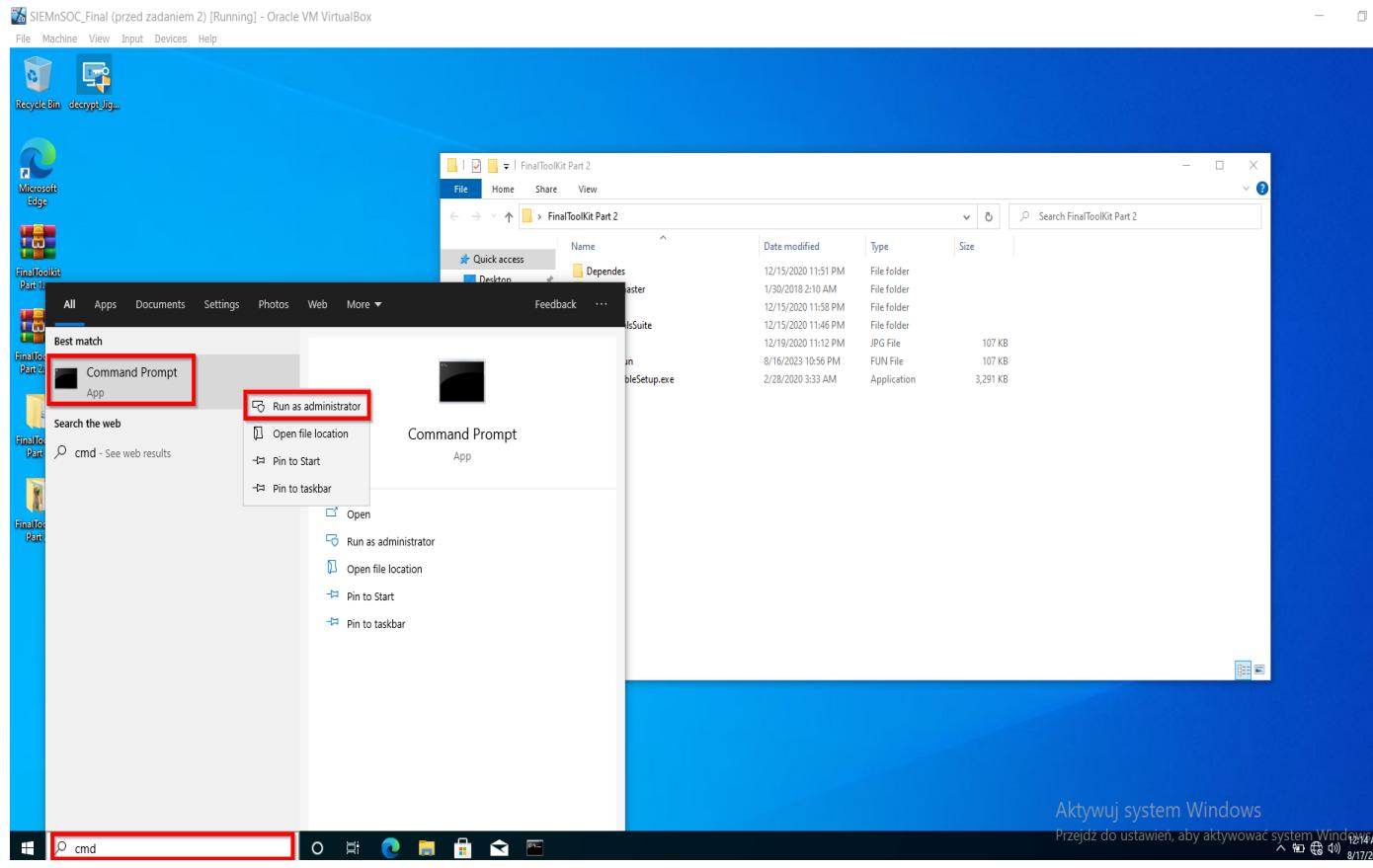
Introduction

This report documents the results of the analysis of the "Dog.jpg" file in the context of detecting potential presence of malicious software (malware). The first part of the analysis focused on identifying potentially suspicious strings within the file using the strings64.exe tool from the SysInternals suite.

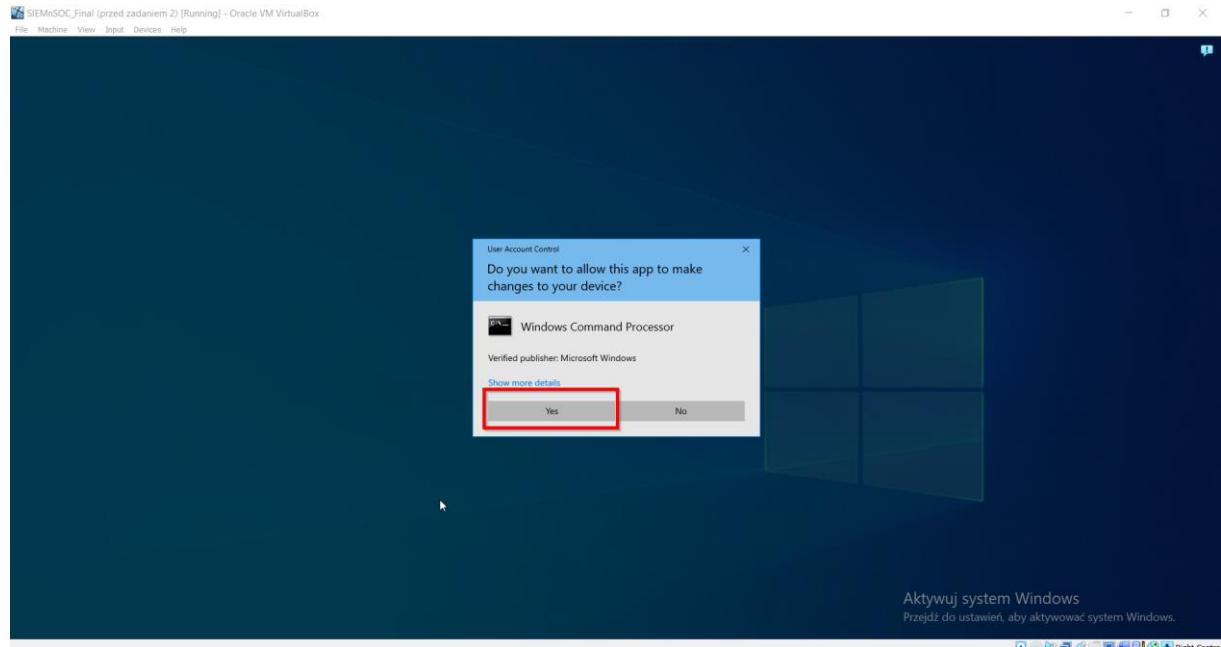
2. Analysis Tool – strings64.exe

The analysis of the "Dog.jpg" file utilized the strings64.exe tool from the SysInternals suite. This tool enables the extraction of textual characters from binary files, which can reveal hidden or encoded information.

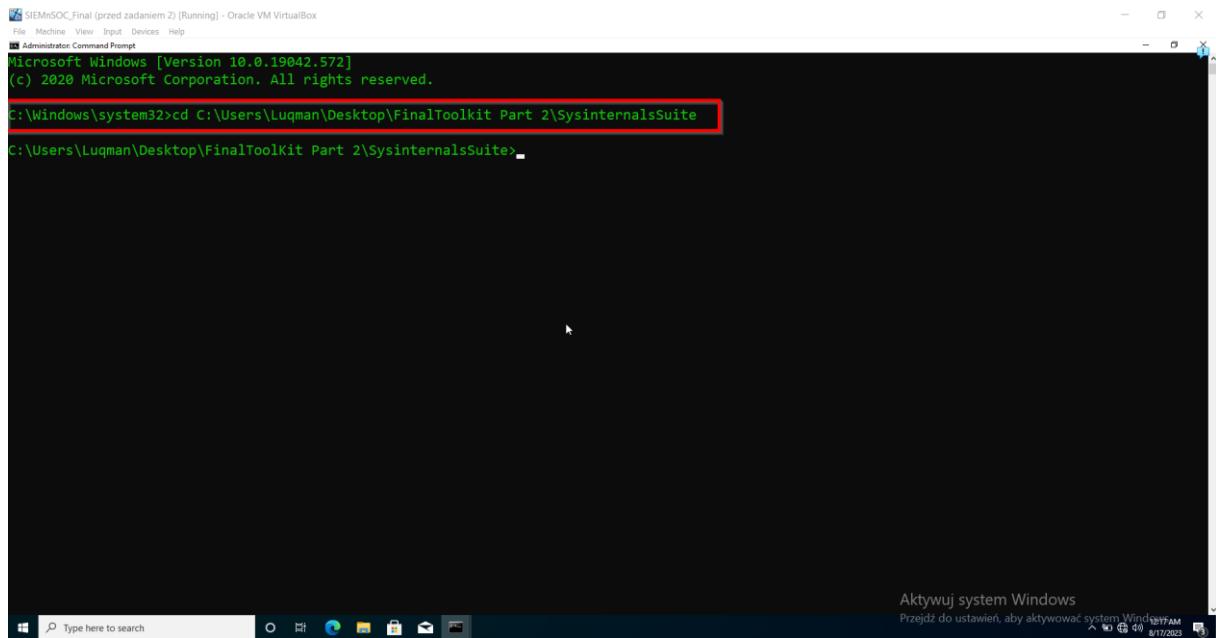
a)



b)



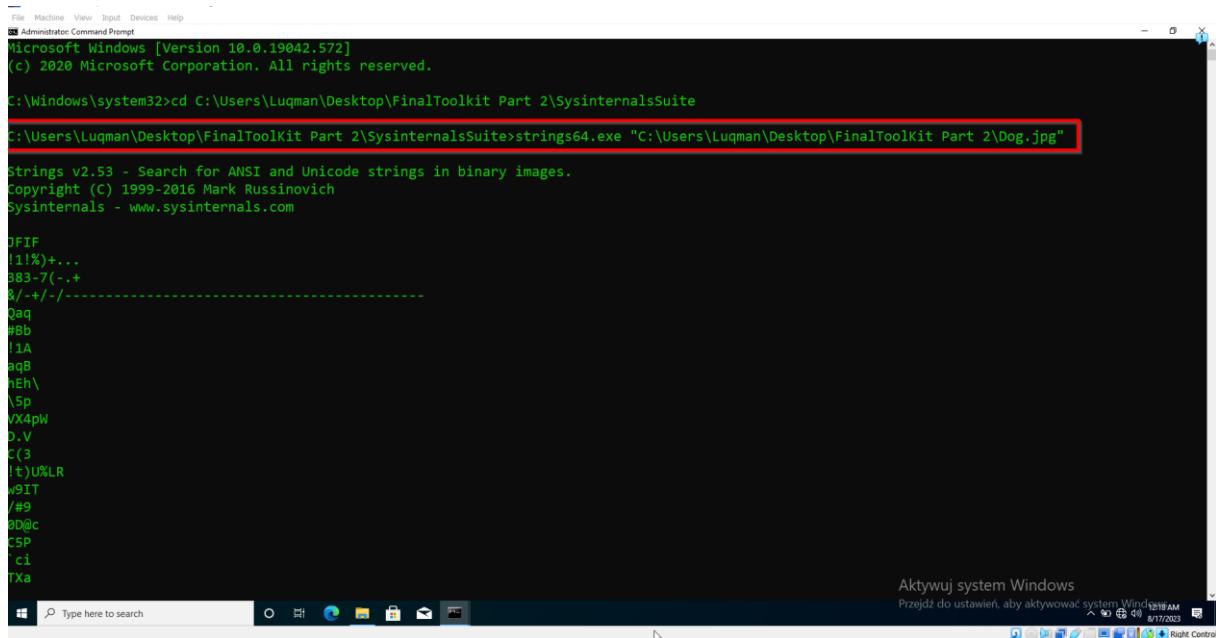
c)



```
SIEMnSOC_Final (przed zadaniem 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.572]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd C:\Users\Luqman\Desktop\FinalToolKit Part 2\SysinternalsSuite
C:\Users\Luqman\Desktop\FinalToolKit Part 2\SysinternalsSuite>
```

d)



```
File Machine View Input Devices Help
Administrator: Command Prompt
Microsoft Windows [Version 10.0.19042.572]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd C:\Users\Luqman\Desktop\FinalToolKit Part 2\SysinternalsSuite
C:\Users\Luqman\Desktop\FinalToolKit Part 2\SysinternalsSuite>strings64.exe "C:\Users\Luqman\Desktop\FinalToolKit Part 2\Dog.jpg"
Strings v2.53 - Search for ANSI and Unicode strings in binary images.
Copyright (C) 1999-2016 Mark Russinovich
Sysinternals - www.sysinternals.com

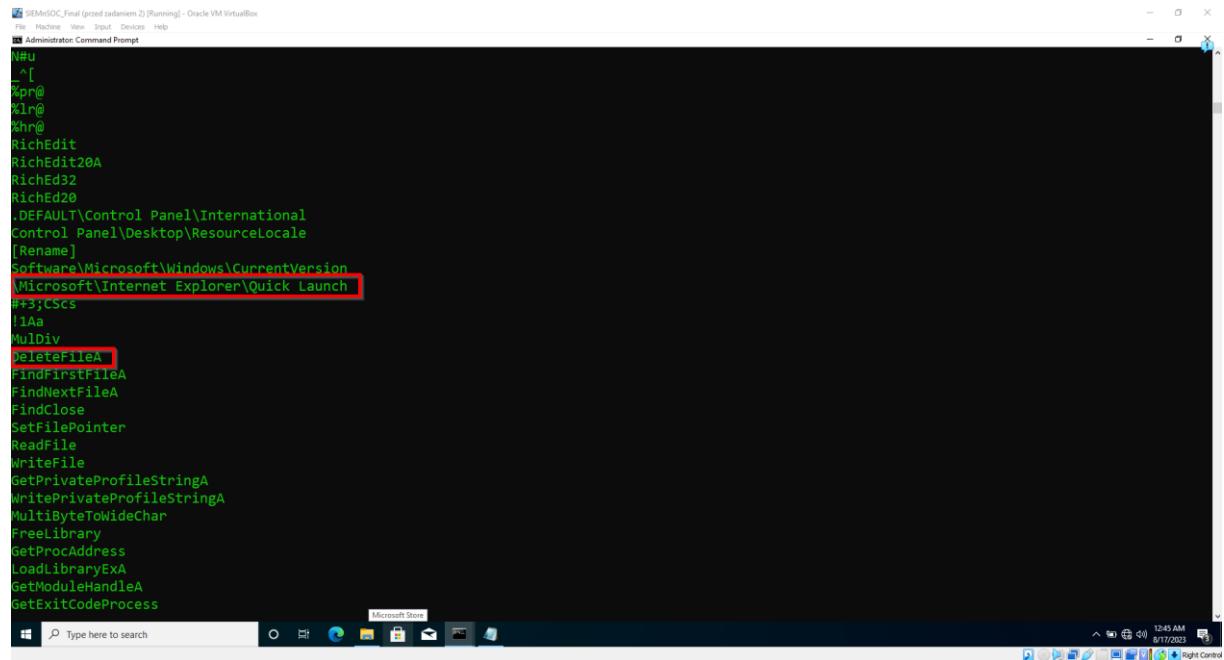
JFIF
!1%)+...
383-7(-.+_
X/-+/-/-----
Qaq
#Bb
!1A
sqB
hEn\
\5p
VXapiW
D.V
c(3
!t)U%LR
x9TT
/#9
eD@c
CSP
`ci
TXa
```

e)

The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The window displays assembly code starting with ".61", followed by several labels like ".text", ".rdata", and ".rsrc", and various memory addresses. A red box highlights the error message "This program cannot be run in DOS mode." at the bottom of the code listing. The Windows taskbar at the bottom includes icons for File Explorer, Task View, Edge, Mail, Photos, and File History, along with a search bar and system status indicators.

- ❖ **!This program cannot be run in Dos mode** is a characteristic message that often appears in executable files of programs for Windows systems.
- ❖ **.text** This Section generally contains the CPU instructions executed when the PE file is run. This section is marked as executable.
- ❖ **.rdata** typically refers to all kinds of constant textual information used by the program, such as user messages, filenames, function names, constant configurations, etc.
- ❖ **.rsrc** This Section contains resources that are used by the PE file, for example, images, icons, etc.

f)

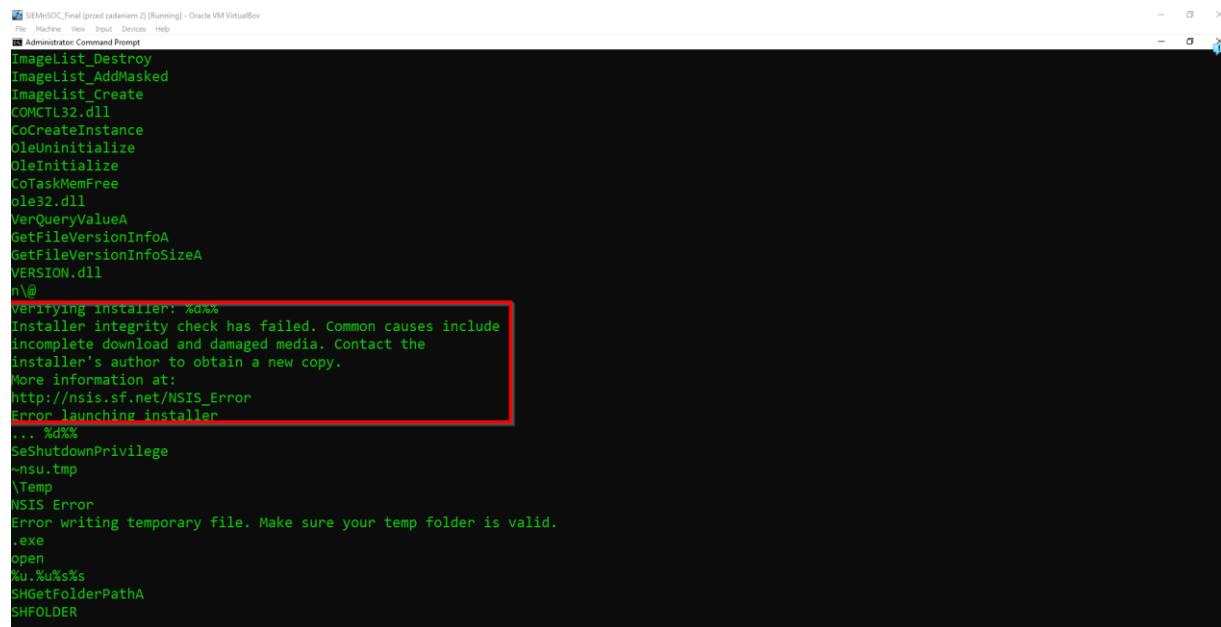


```
SIMeSOC_Final (prized zadaniem 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Administrator: Command Prompt
N#u
L^[
Kpr@
xlr@
Mhr@
RichEdit
RichEdit20A
RichEd32
RichEd20
.DEFAULT\Control Panel\International
Control Panel\Desktop\ResourceLocale
[Rename]
Software\Microsoft\Windows\CurrentVersion
|Microsoft\Internet Explorer\Quick Launch|
##;CSCs
!1Aa
MulDiv
DeleteFileA
FindFirstFileA
FindNextFileA
FindClose
SetFilePointer
ReadFile
WriteFile
GetPrivateProfileStringA
WritePrivateProfileStringA
MultiByteToWideChar
FreeLibrary
GetProcAddress
LoadLibraryExA
GetModuleHandleA
GetExitCodeProcess
12:45 AM
Type here to search Microsoft Store
10:45 AM 8/17/2023 Right Control
```

- ❖ **|Microsoft\Internet Explorer\Quick Launch:** This refers to a location in the registry or file system that could contain shortcuts to frequently visited websites in the "Quick Launch" menu of the Internet Explorer browser (an older Microsoft browser) or in later versions of Windows, in the "Quick Launch" area of the taskbar.

- ❖ The "**DeleteFileA**" function is used to delete a file from the file system. It's a part of the Windows API and provides a way for programs to interact with the file system to perform various file-related operations, such as creating, opening, reading, writing, and deleting files.

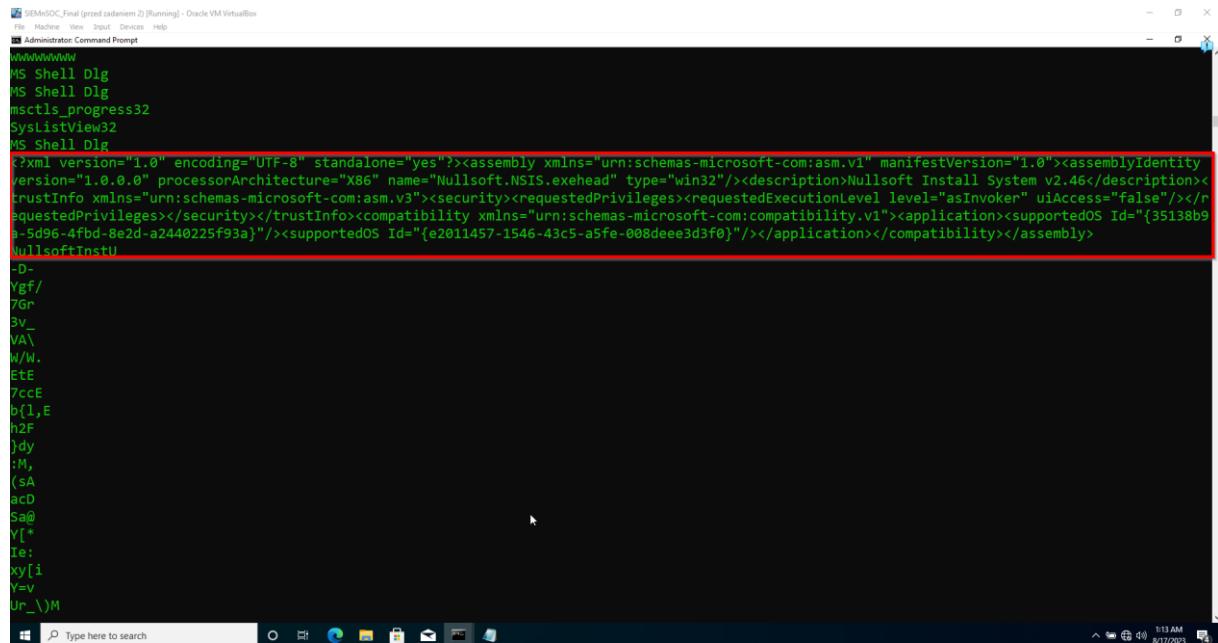
g)



```
File Machine View Input Devices Help
Administrator: Command Prompt
ImageList_Destroy
ImageList_AddMasked
ImageList_Create
COMCTL32.dll
CoCreateInstance
OleInitialize
OleInitializeEx
CoTaskMemFree
OLE32.dll
VerQueryValueA
GetFileVersionInfoA
GetFileVersionInfoSizeA
VERSION.dll
n\@
Verifying installer: %d%
Installer integrity check has failed. Common causes include
incomplete download and damaged media. Contact the
installer's author to obtain a new copy.
More information at:
http://nsis.sf.net/NSIS_Error
Error launching installer
... %d%
SeShutdownPrivilege
~nsu.tmp
\Temp
NSIS Error
Error writing temporary file. Make sure your temp folder is valid.
.exe
open
%u.%u%s%
SHGetFolderPathA
SHFOLDER
```

- ❖ **string verifying installer: %d% Installer integrity check has failed. Common causes include incomplete download and damaged media. Contact the installer's author to obtain a new copy. More information at: http://nsis.sf.net/NSIS_Error Error launching installer - text seems to be an error message related to an installer.**

h)



The screenshot shows a Windows Command Prompt window titled "SEMeSOC_Final (przeloadeniem 2) [Running] - Oracle VM VirtualBox". The window contains the following XML code:

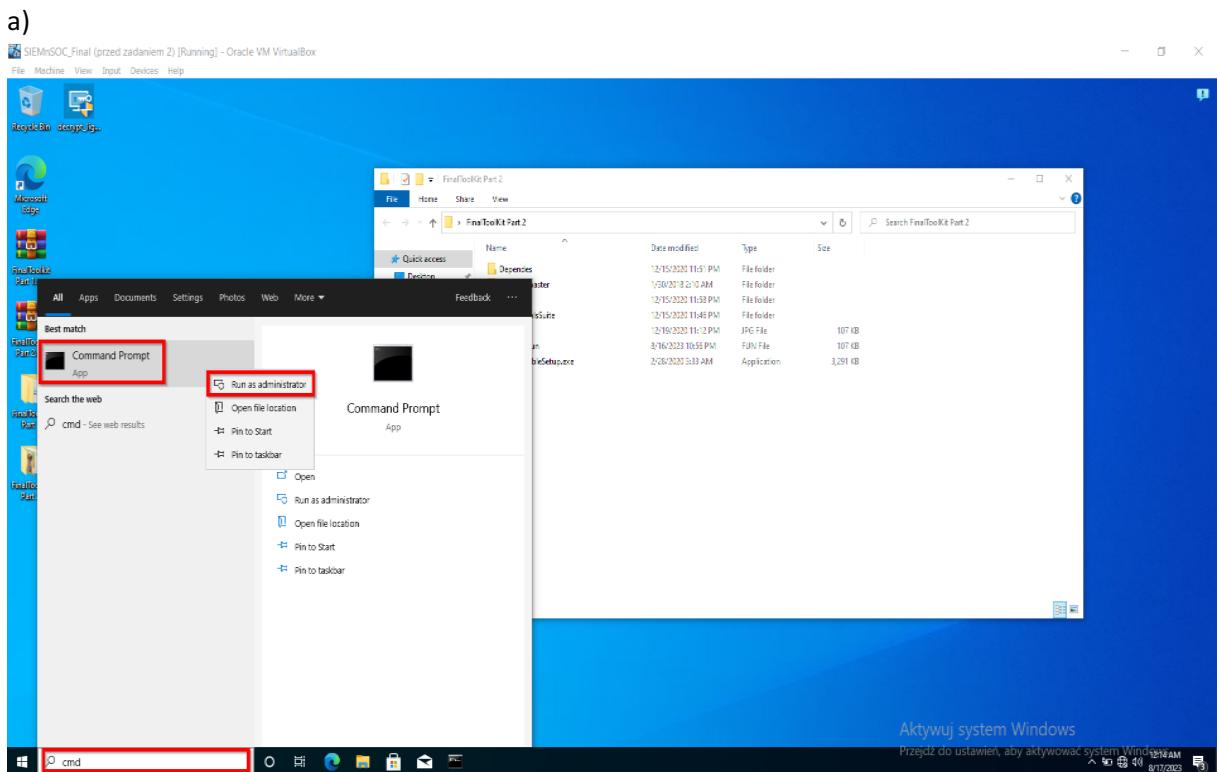
```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?><assembly xmlns="urn:schemas-microsoft-com:asm.v1" manifestVersion="1.0"><assemblyIdentity version="1.0.0.0" processorArchitecture="X86" name="Nullsoft.NSIS.exehead" type="win32"/><description>Nullsoft Install System v2.46</description><trustInfo xmlns="urn:schemas-microsoft-com:asm.v3"><security><requestedPrivileges><requestedExecutionLevel level="asInvoker" uiAccess="false"/></requestedPrivileges></security></trustInfo><compatibility xmlns="urn:schemas-microsoft-com:compatibility.v1"><application><supportedOS Id="{35138b9a-5d96-4fbd-8e2d-a2440225f93a}" /></application></compatibility></assembly>
```

The XML code is highlighted with a red border.

- ❖ <?xml version="1.0" encoding="UTF-8" standalone="yes"?><assembly xmlns="urn:schemas-microsoft-com:asm.v1" manifestVersion="1.0"><assemblyIdentity version="1.0.0.0" processorArchitecture="X86" name="Nullsoft.NSIS.exehead" type="win32"/><description>Nullsoft Install System v2.46</description><trustInfo xmlns="urn:schemas-microsoft-com:asm.v3"><security><requestedPrivileges><requestedExecutionLevel level="asInvoker" uiAccess="false"/></requestedPrivileges></security></trustInfo><compatibility xmlns="urn:schemas-microsoft-com:compatibility.v1"><application><supportedOS Id="{35138b9a-5d96-4fbd-8e2d-a2440225f93a}" /></application></compatibility></assembly> - The entire XML fragment constitutes the manifest of an application or installer created using NSIS (Nullsoft Scriptable Install System). This manifest contains information about the application, its requirements, and compatibility with the operating system.

2. Hash Extraction and VirusTotal Analysis

The SHA-1 hash of the "Dog.jpg" file was extracted using the certutil.exe tool. This hash was then submitted to the www.virustotal.com online platform for analysis. The results of this analysis revealed that the file in question is indeed recognized as malicious by various antivirus engines present on the VirusTotal platform. Also further analysis was conducted on the VirusTotal platform, specifically in the "Graph Summary" tab, which led to the remarkable discovery of a hidden "exe" file embedded within the binary data of "Dog.jpg." This revelation underscores the elevated complexity of the threat, suggesting the utilization of advanced techniques such as steganography or encryption.



b)

SIMeS0C_Final (próximamente 2) [Running] - Oracle VM VirtualBox
 File Machine View Input Devices Help
 Administrator Command Prompt
 Microsoft Windows [Version 10.0.19042.572]
 (c) 2020 Microsoft Corporation. All rights reserved.
 C:\Windows\system32>cd C:\Users\Luqman\Desktop\FinalToolKit Part 2
 C:\Users\Luqman\Desktop\FinalToolKit Part 2>certutil.exe -hashfile Dog.jpg sha1
 SHA1 hash of Dog.jpg:
 9c66b02054403daa6a4fcdac316ff33e852ea411
 CertUtil: -hashfile command completed successfully.
 C:\Users\Luqman\Desktop\FinalToolKit Part 2>

c)

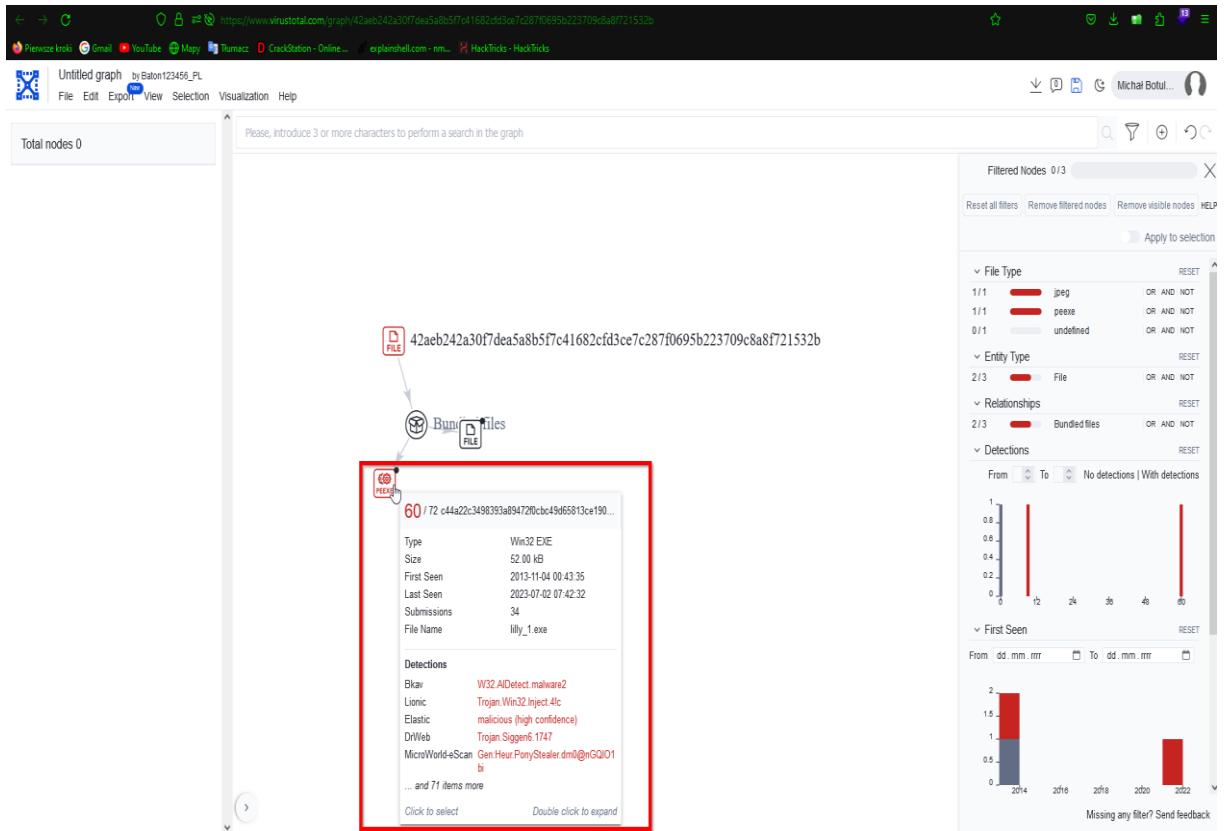
https://www.virustotal.com/gui/file/42aeb242a3097deaf5a8b5f7c41682cd3ce7c2870695b223709b8a8f721532b/detection

Community Score: 9 / 59

Popular threat label: trojan.fakepic.beaxxe

Security vendor	Detection	Family	
Avira (no cloud)	DR/FakePic.Gen	Cynet	Malicious (score: 99)
Cynet	W32/Boaxxe.PQDD-5801	Fortinet	W32/Boaxxe.BVBtr
Google	Detected	Ikarus	Dropper.FakePic
NANO-Antivirus	Trojan Win32.Inject.cthmmr	Rising	Trojan.Inject!B.103 (CLOUD)
VBA32	Trojan.Inject	Acronis (Static ML)	Undetected
AhnLab-V3	Undetected	ALYac	Undetected
Anti-AVL	Undetected	Arcabit	Undetected
Avast	Undetected	AVG	Undetected
Baidu	Undetected	BitDefender	Undetected
BitDefenderTheta	Undetected	Blkav Pro	Undetected

d)

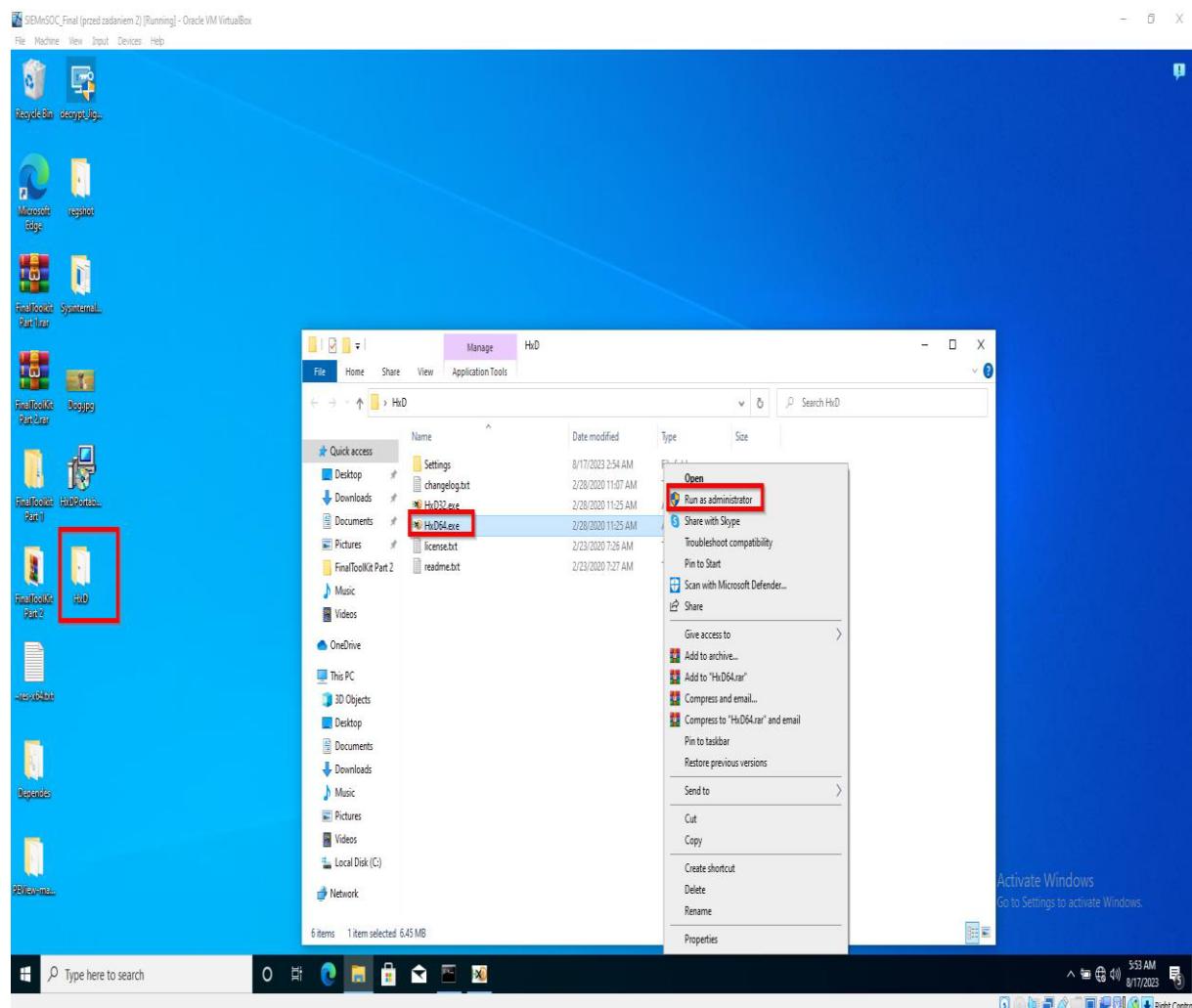


3. In this section of report the findings of the malware file analysis, with a specific focus on the process of extracting a hidden "exe" file from the "Dog.jpg" file. The analysis also encompasses the identification of missing DLL libraries required by the program and aspects related to the detectability of the extracted "exe" file.

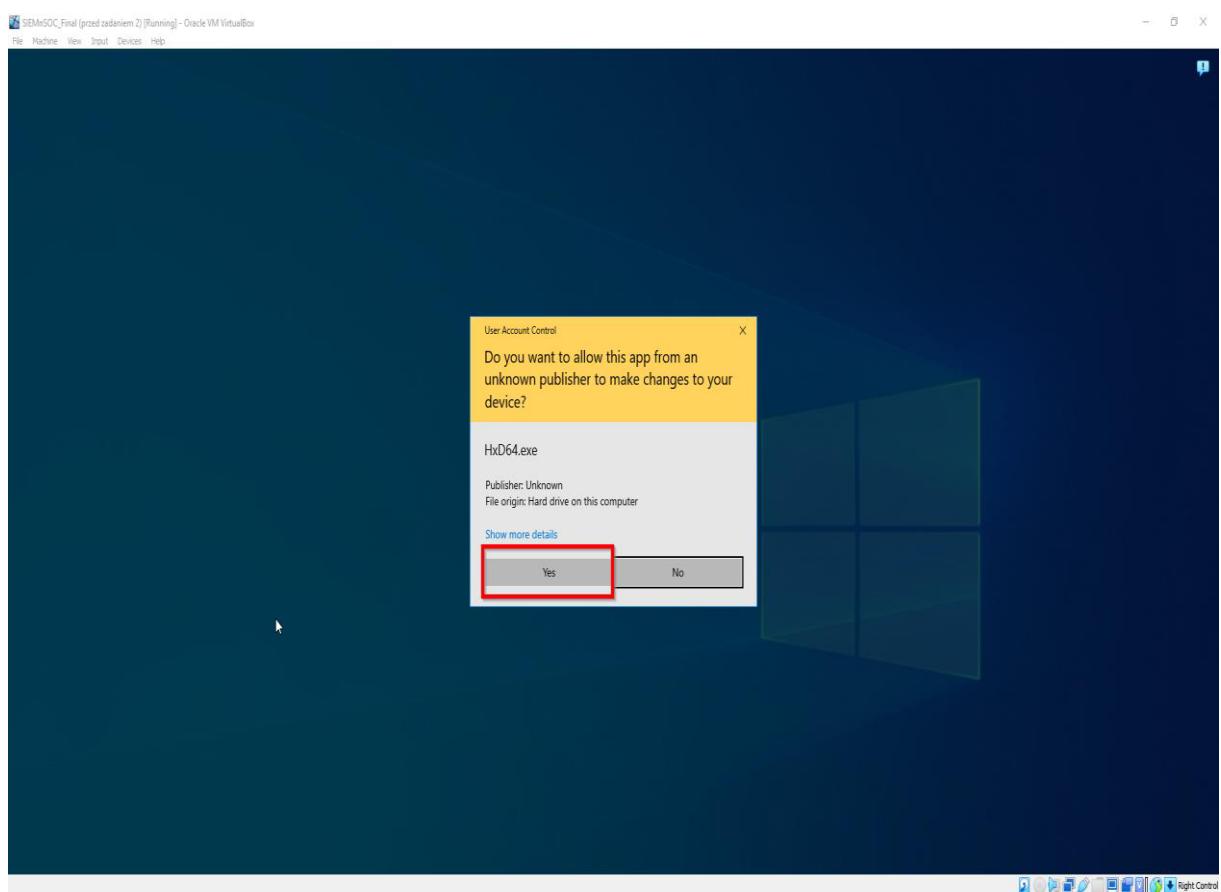
The analysis of the malware file commenced with the extraction process of the concealed "exe" file by use "HxD" program. This procedure aimed at revealing the content of this file and comprehending its functionality. The initial step involved locating the beginning of the program, which was covertly embedded within the "Dog.jpg" file. Upon discovering the "4D 5A" sequence (MZ header), the endeavor to copy the entire line from this sequence to the end of the file was undertaken. Subsequently, the duplicated sequence was stored as a novel file named "untitled.exe".

Post preparation of the "untitled.exe" file, a thorough analysis was executed employing the Dependency Walker tool. This initiative was aimed at identifying the DLL libraries indispensable for the program's seamless functioning.

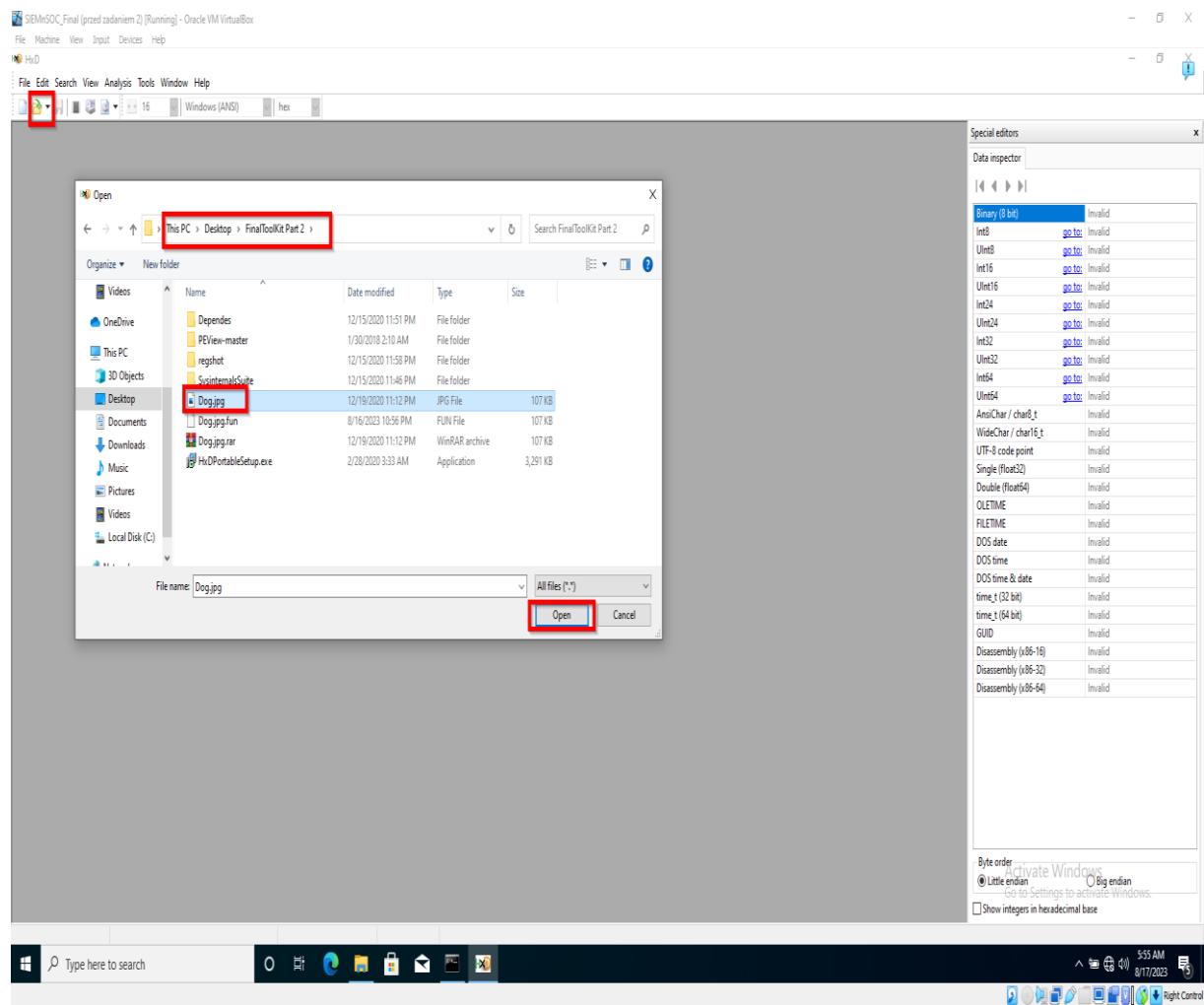
One of DLL's found via Dependency walker that program uses, which is not found is **API-MS-WIN-CORE-APIQUERY-L1-1-0.DLL**.



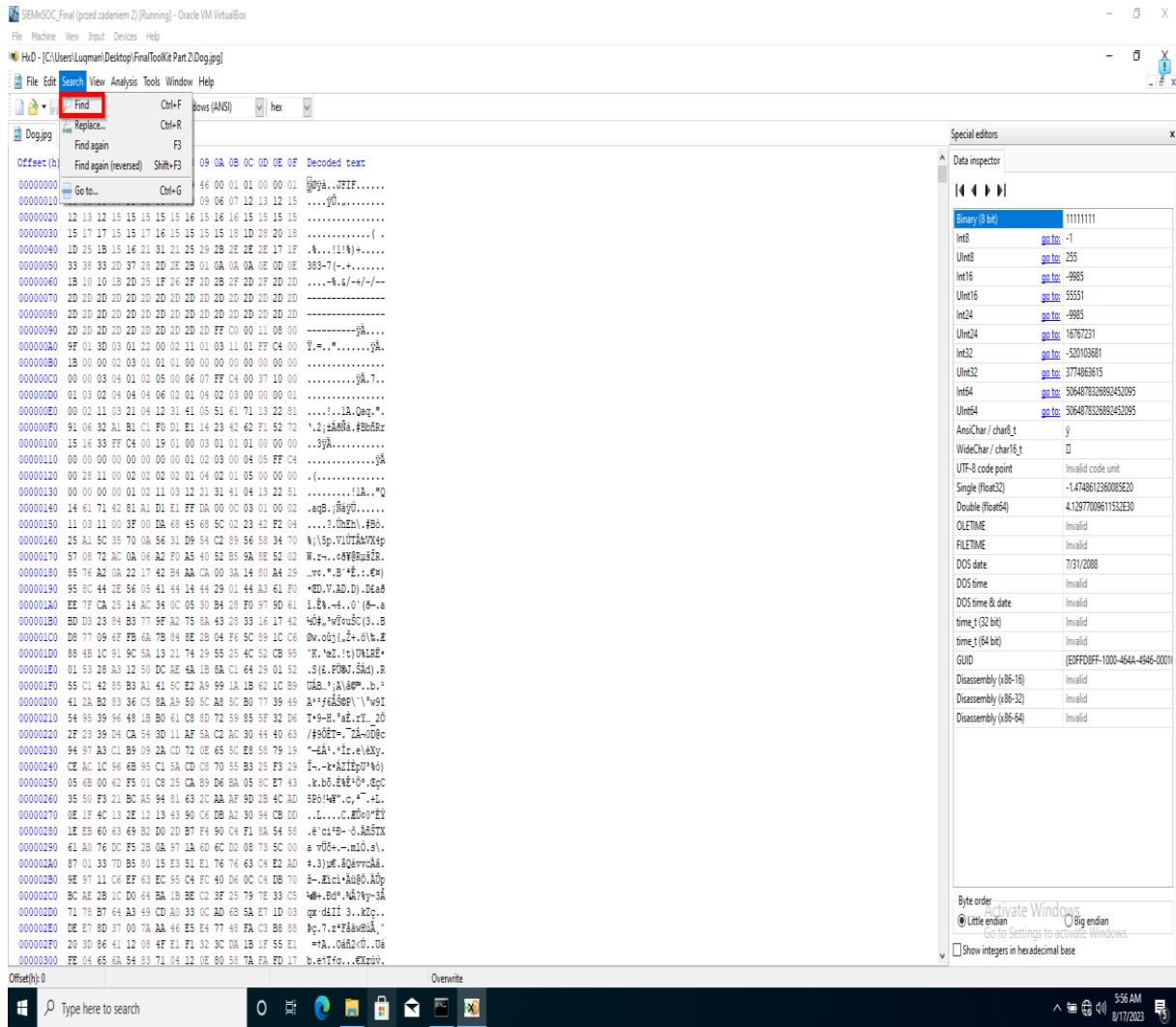
b)



c)



d)



e)

SIMnSOC_Final (przed zadaniem 2) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

HxD - [C:\Users\Luqman\Desktop\FinalToolKit Part 2\Dog.jpg]

File Edit Search View Analysis Tools Window Help

Dog.jpg

Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F Decoded text

00001830 BC 00 5F B1 31 03 7B 79 93 37 60 F7 24 CC B6 61 4.._f1.(y^7=-\$iqa
00001840 1B E2 07 83 70 48 BF 7D 63 F7 54 C5 5A 24 92 33 .å.fþH)c-TÅz\$'3
00001850 68 32 0E D1 CA 2F 02 11 2B 36 60 FF 00 E4 27 94 k2.ÑÉ.,.+6'y.ä'
00001860 F7 51 52 87 9D A7 96 A0 4E A6 D7 E7 BA 4A B1 6D +QR+.S-N|xçøJm
00001870 AE CA BD 8E 7B 62 C6 01 04 D8 CF 98 93 39 AF ED 0ÉñézB..0!~øi
00001880 7B DD 0B 0B 4F 24 CE BB 1D 24 OD 9D 91 5F 5C {Y..Oçf».S...`'\
00001890 35 C6 27 7B 6D A0 3F 75 1E 20 89 3A 91 06 DA B7 5E'(m?u..h.'Ü.
000018A0 F6 11 E8 DB 3A AF 04 D4 C1 BB 46 C3 73 34 00 4D ö.ëÜ:_.ÖÅwñås4.M
000018B0 C1 30 60 BA 74 B4 7D 12 67 87 11 98 82 0C BA F1 Á~"t').gç.,.,ñ
000018C0 20 B5 A3 CA 4C 72 CC 75 EC 9F C6 54 1A E8 07 EE µéñruiYET.ä.i
000018D0 9D 82 AB 62 E3 43 13 02 76 E6 51 FD 01 CD D0 A7 ..«båC..veQý.íD\$
000018E0 F8 44 BA 4C 06 73 13 98 49 68 11 AC 82 01 93 B4 øD'L.s."In..,."
000018F0 85 A1 5E 93 09 CA E6 02 4C 36 E0 01 94 58 89 1A ..;~".Éæ.Léå."X.
00001900 65 61 B4 21 D2 AA 4B 33 C0 F2 8C BA 6E 3F 28 ia'Ö'K3håDmn?(
00001910 0E AB 37 EF DC 58 68 84 E3 B2 AB 1A 19 35 F0 07 .«.iÜKh..ä~..58.
00001920 05 82 6B 22 C0 91 24 18 CB BC FC A2 D6 B6 A8 55 ..k"Å's.ÉdiöÜ"U
00001930 A9 19 2F 19 46 62 45 B3 4D 8E 9E 50 48 02 6D 3C @./.FDEPMéZPH.m<
00001940 D6 89 3E 68 00 4E 59 FA EE 97 AC 1B 3A 6B 7F Ö»h.NYú l~..k.
00001950 CT E1 1E 50 AA 47 FF D9 4D 5A 90 00 03 00 00 00 Çá.PGyÜM.....
00001960 04 00 00 00 FF FF 00 00 B8 00 00 00 00 00 00 00yy.....
00001970 40 00 00 00 00 00 00 00 00 00 00 00 00 00 00 @.....
00001980 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00001990 00 00 00 D8 00 00 00 0E LF BA OE 00 84 09 CDø.....^..í
000019A0 21 B8 01 4C CD 21 54 68 69 73 20 70 72 6F 67 72 !,l!This progr
000019B0 61 6D 20 63 61 6E 6E 6F 74 20 62 65 20 72 75 6E am cannot be run
000019C0 20 69 6E 20 44 4F 53 20 6D 6F 64 65 22 0D 0D OA in DOS mode....
000019D0 24 00 00 00 00 00 00 31 B8 84 3A 75 D9 EA 69 \$.....,..uðéi
000019E0 75 D9 EA 69 75 D9 EA 69 B6 D6 B5 69 77 D9 EA 69 uðéiùðéiøùðéi
000019F0 75 D9 EB 69 EE D9 EA 69 B6 D6 B7 69 64 D9 EA 69 uðéiùðéiøùðéi
00001A00 21 FA DA 69 7F D9 EA 69 B2 DF EC 69 74 09 EA 69 !úñi.úéiøùðéi
00001A10 52 69 63 68 75 D9 EA 69 00 00 00 00 00 00 00 Richuðéi.....
00001A20 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00001A30 50 45 00 00 4C 01 05 00 CC E3 1A 4B 00 00 00 PE..L..íå.K....
00001A40 00 00 00 E0 00 0F 01 OB 01 06 00 00 5E 00 00å.....^..
00001A50 00 84 02 00 00 04 00 00 FA 30 00 00 00 10 00 00öö.....
00001A60 00 70 00 00 00 40 00 00 10 00 00 00 02 00 00 .p...@.....
00001A70 04 00 00 06 00 00 00 04 00 00 00 00 00 00 00 00
00001A80 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..e.....e

Find X

Text-string Hex-values Integer number Floating point number

Search for: 4D 5A

Search direction: All

OK Cancel

Results

Checksum Search (1 hits)

Offset(h): 1958 Excerpt (hex): 5F EE 97 AC 1B 3A 6B 7F C7 E1 1E 50 AA 47 FF D9 4D 5A 90 00 03 00 00 04 00 00 00 FF FF 00 00

Excerpt (text): j~.ùk.Çá.PGyÜM.....jj..

Length(h): 2 Overwrite

Type here to search

Activate W Go to Settings

f)

SIMnSOC_Final (prized zadaniem 2) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

HxD - [C:\Users\Luqman\Desktop\FinalToolKit Part 2\Dog.jpg]

File Edit Search View Analysis Tools Window Help

Dog.jpg

Offset(h) 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F Decoded text

0001A7E0 CF 58 53 4D 64 AF F2 B4 F2 D0 8E 5C 66 08 03 IXSMd ö'0.Džaf..
0001A7F0 7D 12 82 D2 E5 F1 OC 47 BB BE 41 28 B3 14 38 91),,Óéñ.Gw&Q(*.^'
0001A800 3B A3 A8 04 58 43 29 14 EA 04 7E 04 4D C6 AA 30 ,é«OKX).e.,~.mE*0
0001A810 EC 09 6F 97 18 FD C4 46 DF CE 38 7B 84 8A F1 3D l.o.-ýAFříš(.šñ=.
0001A820 E4 5F EE AB 40 9E D7 7A 53 94 85 F4 AC F9 E5 AB á_ia@ž*xS"-.ó-úáv.
0001A830 F5 23 C2 0B 88 5E C0 BB 31 71 A2 DE 8A 00 8A 81 ,fá,~^AwlgP§.S.
0001A840 23 E5 24 F6 66 86 42 91 15 2D 6D 4E 33 87 34 32 #á§oftB~,-mN+42
0001A850 31 40 1E A4 75 98 37 D1 B4 AC C1 C2 E1 09 DA B1 #d.Ru~7N~-áÁá.Ú
0001A860 E4 69 2B 04 7C 4E 2D 0F EC 5D 0F EB F7 57 18 2E áí+.,[N..i].é~W..
0001A870 27 A9 79 65 44 E2 09 21 3D 93 92 6E A1 65 28 E5 @"yeDá.!=""n;e(l
0001A880 55 ED 6E 5F E8 B0 6B A1 E6 E2 65 FD 5F E1 AC 0E Jñ.é"K;áééy.á(1
0001A890 3A 19 56 13 FD 16 9B 66 4E SA 98 BA 0F 7C B7 A8 ,^V.Ý,>ENZ"^.|~é
0001A8A0 AD 84 FB 15 88 F7 FF 0E 1C B3 02 C0 8C F5 66 F5 ..ü.<+y.,^AéGfF3
0001A8B0 JA 1F BB 07 E3 75 2D C5 1D 88 A7 CF 1C A4 85 37 ..m.áú~.é,SI.ú.7
0001A8C0 7F 32 ED 22 3D E1 10 5A 5C 7D 88 8E 30 E5 82 DF .21=~.2)\>Zóá,á
0001A8D0 53 89 EF 52 AE DA C4 BA 0D 26 B2 AE B5 A5 44 F5 SK1éBUDI.é"é@yYD
0001A8E0 CD 57 1C 5C 26 0F D4 7F E9 AC 01 45 5A BE 8B E7 IW.é.é~.EZéKç
0001A8F0 3C 50 A8 06 C6 39 11 50 3B 90 25 DF 61 D6 49 30 <P..E3.P8.ååöÖ
0001A900 2B A1 EB 89 0F 91 97 21 2B 30 E1 D1 B2 4C A6 E9 +éh..~!-+0ñLé
0001A910 3F 51 79 A4 C8 10 6C BD 69 8D 97 66 D1 9E 13 15 oQymé.1ñi.-fñé..
0001A920 AF 34 AF DC 26 E8 BC D2 D4 A4 EA 70 CB 6F 87 BF é"ÜéhåOéMépÉotj
0001A930 6B 89 E7 35 EB 1F 60 42 B2 C4 69 78 46 4E CC B4 khç5E."B"éixxFNI
0001A940 3B 56 93 51 E4 39 89 18 B6 A1 D6 72 1D 2B BD B0 ,\VséäéW.é|Orb+é
0001A950 D7 4C D9 23 2F 84 FB 5A F9 3E 3B 0E 8B 81 29 EA xÜé./,óZéU>.;,.é
0001A960 51 E3 5E DB C5 78 16 CF 7D 5A B1 EO 75 28 1B 81 ad.úñ.é.é.é.é
0001A970 25 B6 C6 76 3A 65 59 03 35 B0 10 01 D7 EE 1F ééYr:éY.5"^.x.é
0001A980 3F BB 71 25 72 C5 9C 43 1A 6E 8B 95 86 04 C5 ;wqgrAéCj..ñc.+.é
0001A990 37 75 F6 3C D4 69 C6 60 FA 12 ED 8A F2 D4 84 B0 uwd.óéM.é.é.é.é
0001AA00 2F 39 C9 56 D4 06 9C B6 38 07 57 24 33 20 06 50 /ééV.é.é.é.é.é.é
0001AA00 CA F0 FA 8B BB F2 46 A1 6E Undo Ctrl+Z
0001AA00 ID 5A 52 2C 0C 13 1D E5 85 Cut Ctrl+X
0001AA00 F2 A8 1C A5 2B 52 41 7C 77 Copy Ctrl+C
0001AA00 F3 5C 82 08 41 5D 4E 2E 25 Paste insert Ctrl+V
0001AA00 16 1B 8F 9E A9 C0 33 40 08 Paste write Ctrl+B
0001AA00 35 49 47 BC 7E FD 34 CF 97 Delete Del
0001AA10 2C 62 41 4B E1 39 C0 FF 6F
0001AA20 \$3 5C 0D 9D CF A9 C4 D9

Results Checksum Search (1 hits)

Offset	Excerpt(hex)
1958	5F EE 97 AC 1B 3A 6B 7F C7 E1 1E

Fill selection... Select block... Ctrl+E
Select all Ctrl+A Copy offset Alt+Ins

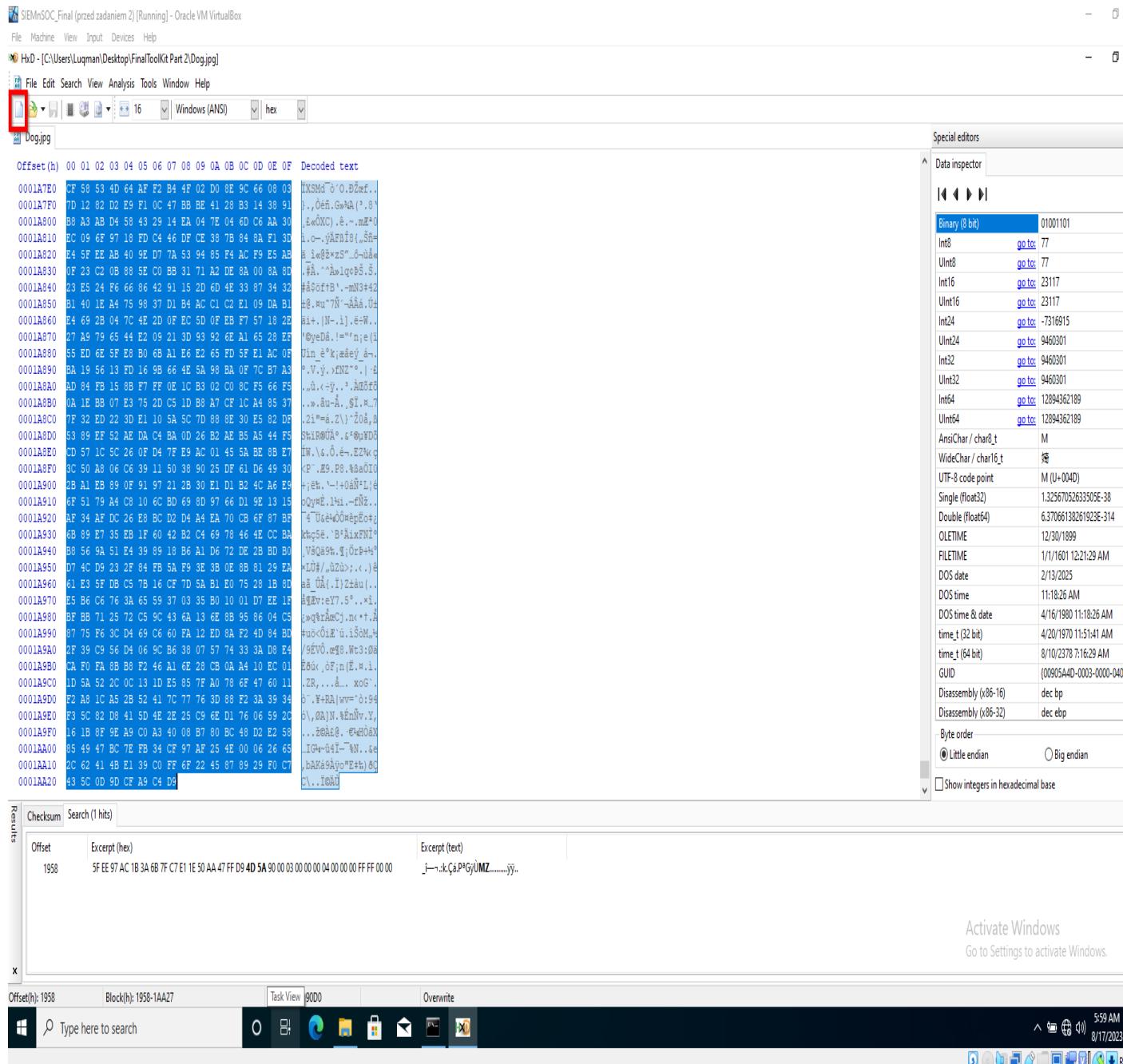
Excerpt (text) 00 00 04 00 00 00 FF FF 00 00 j=~.k.çá.þþýUMZ.....ýj..

Activate Windows Go to Settings to activate Windows

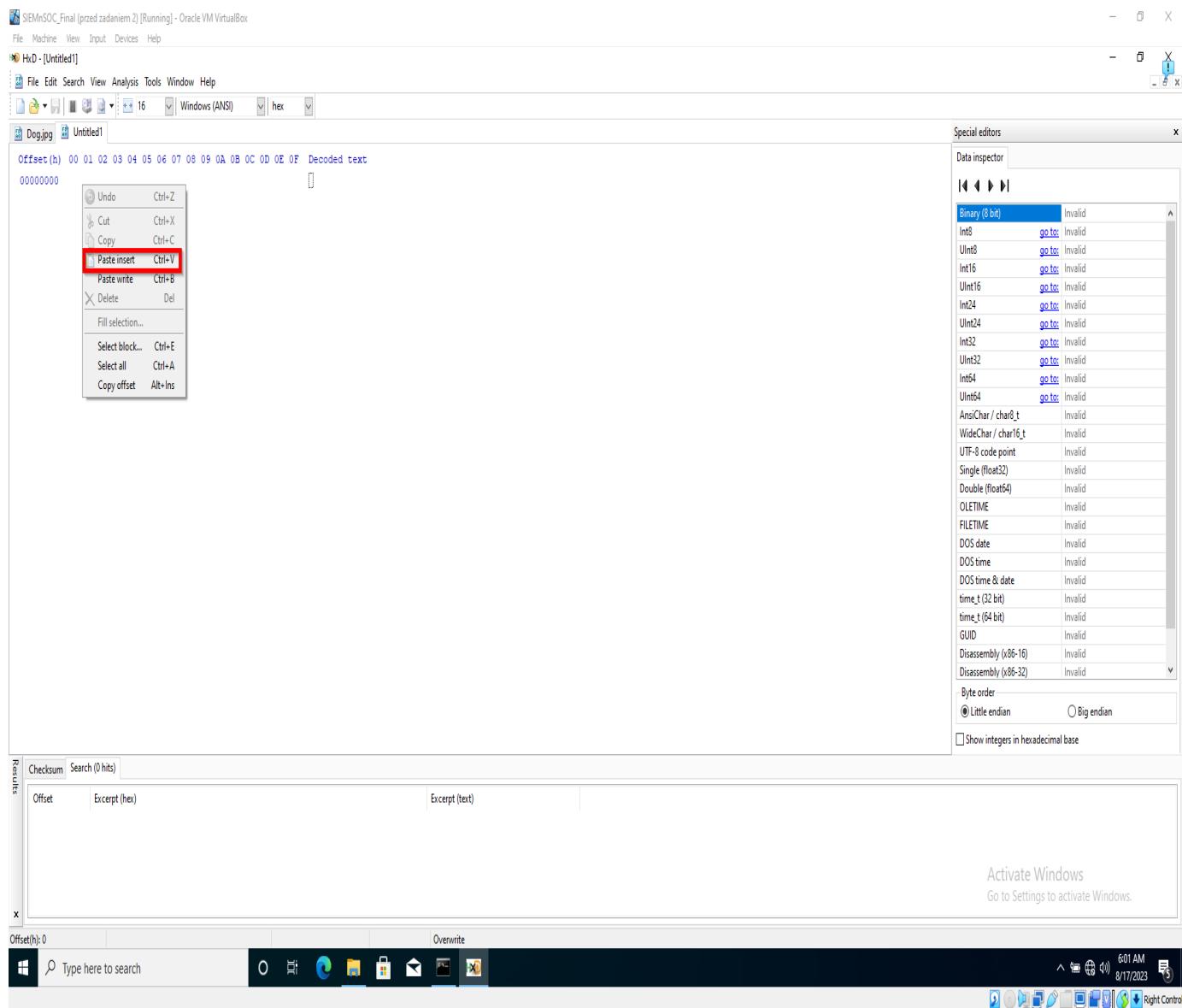
Offset(h): 1958 Block(h): 1958-1AA27 Length(h): 19000 Overwrite

Type here to search

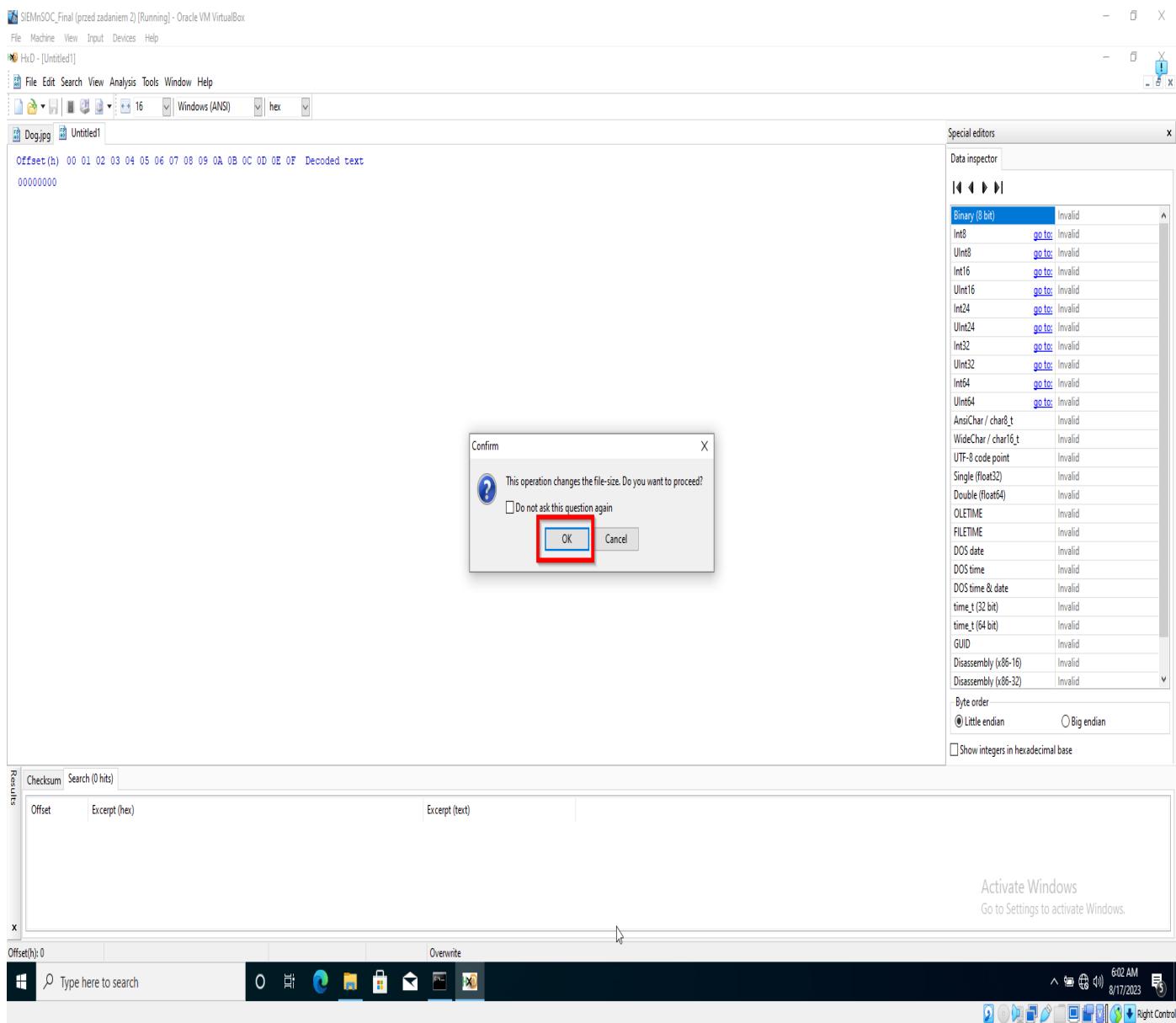
g)



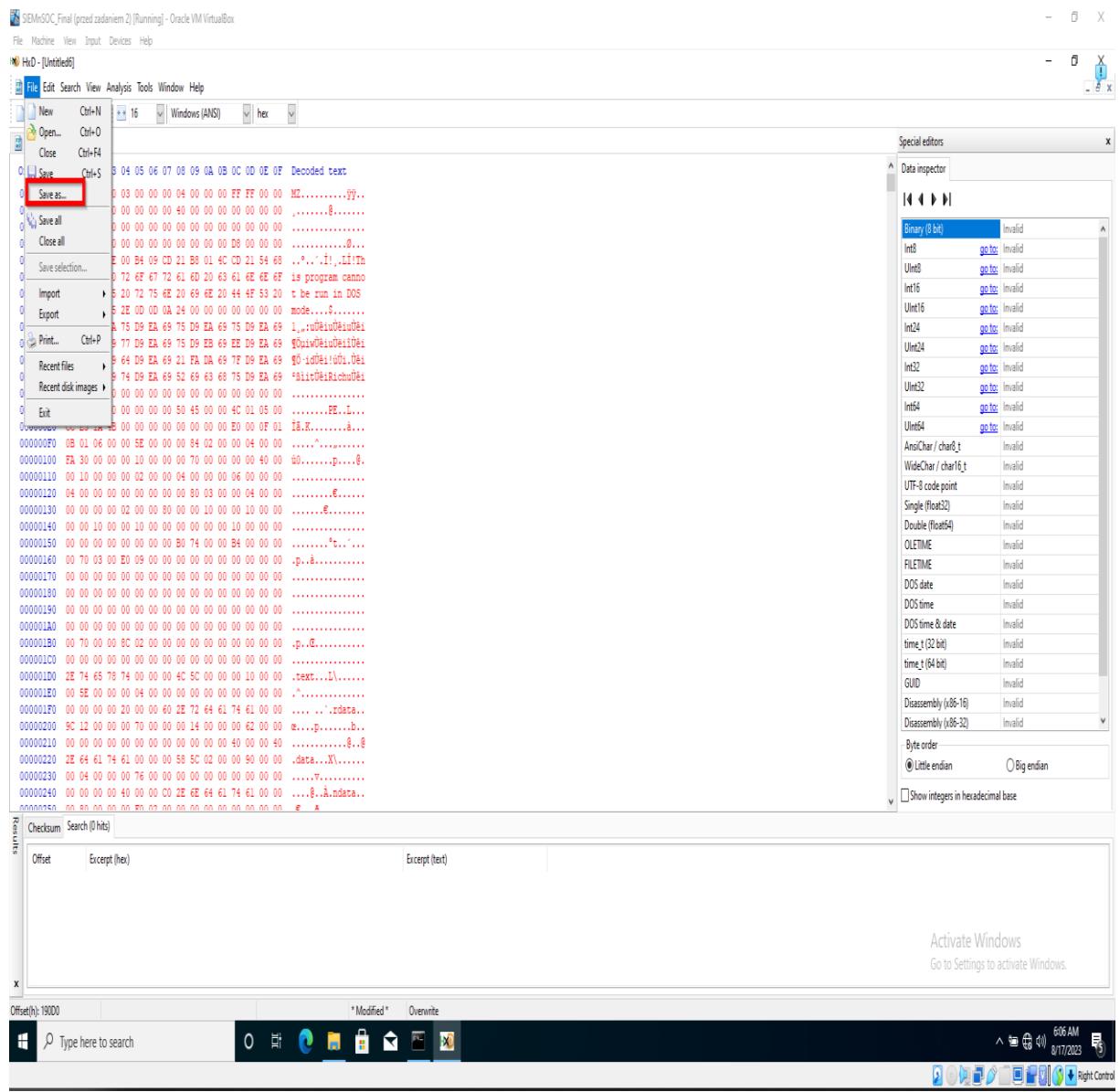
h)



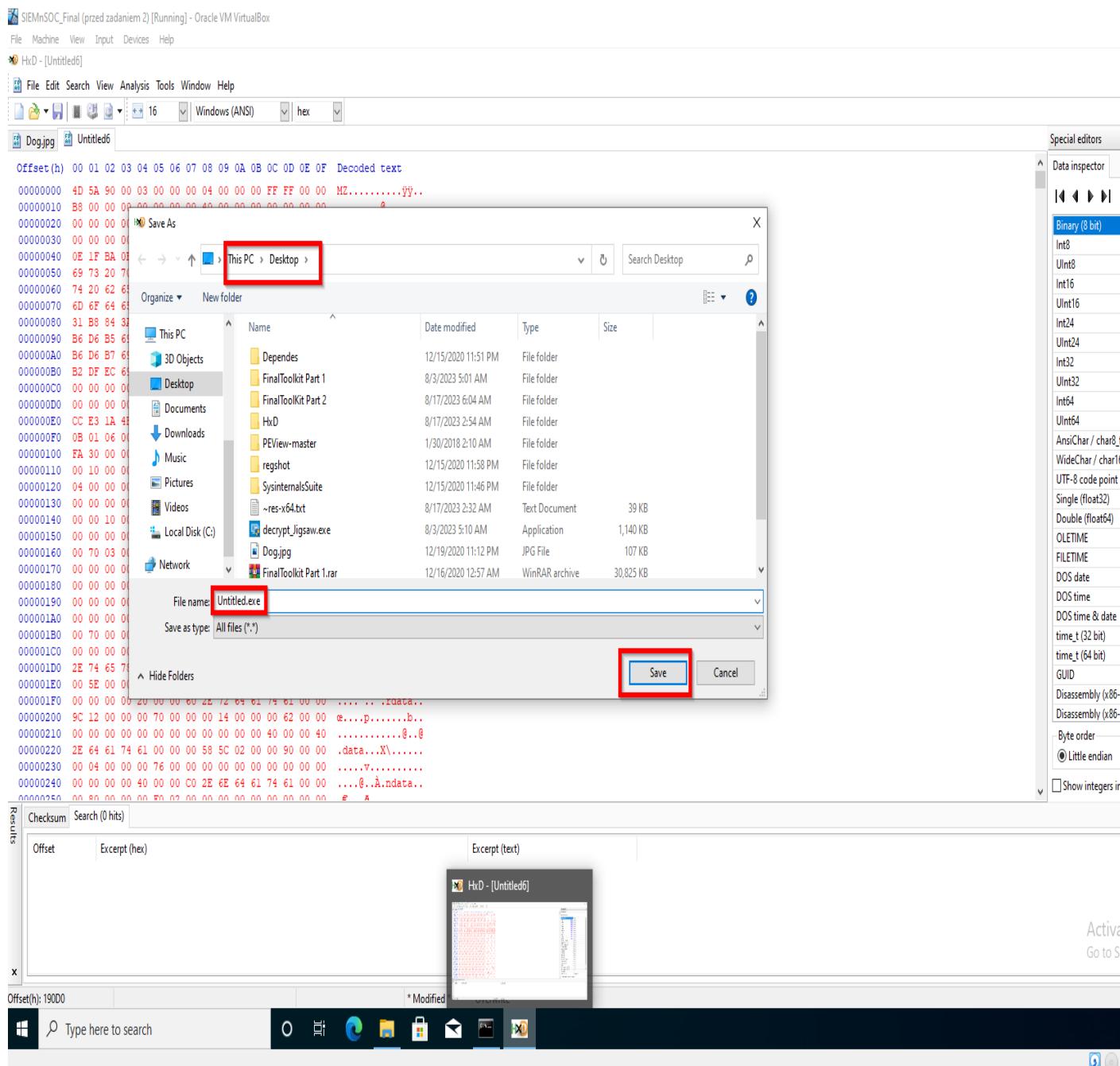
i)



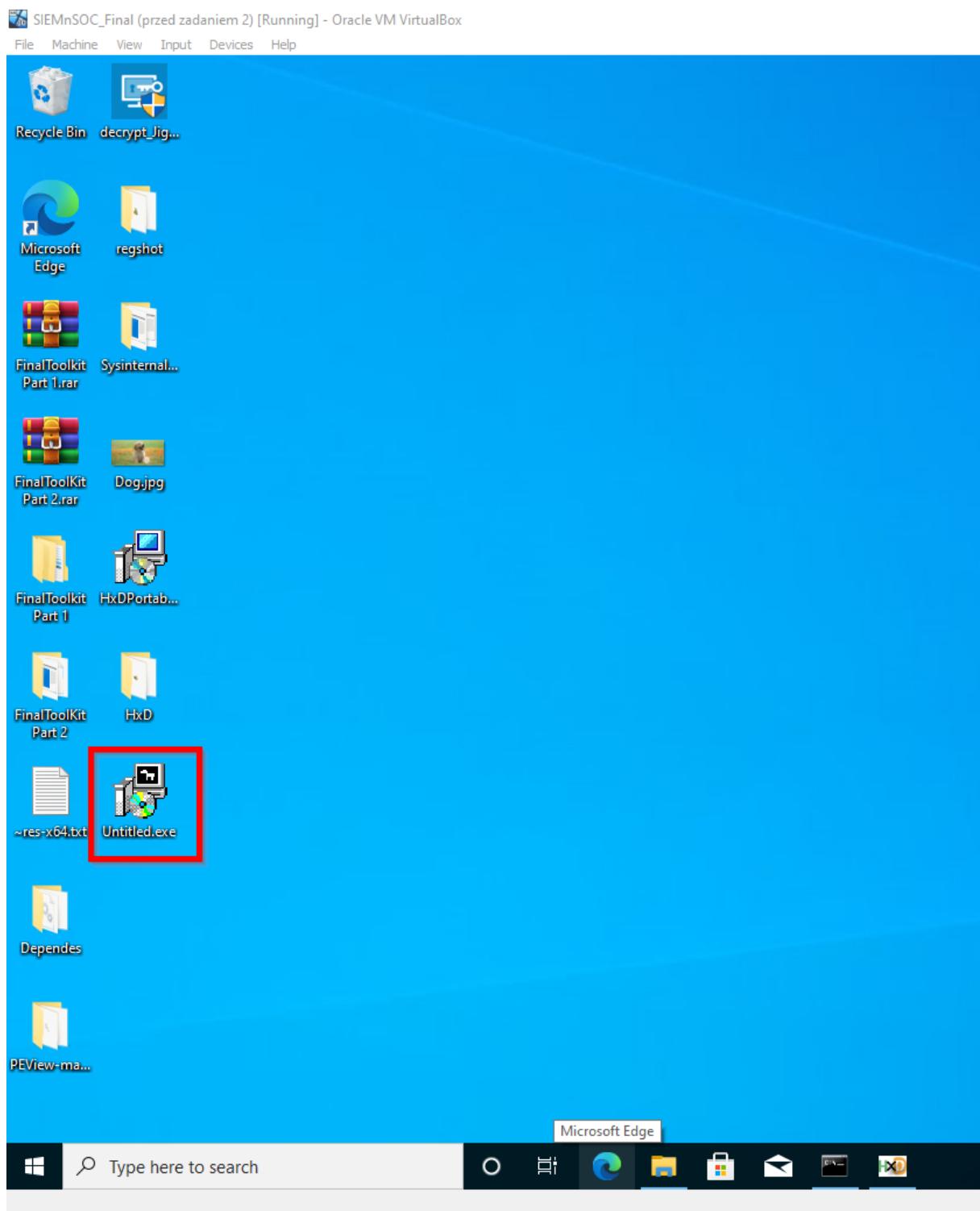
j)



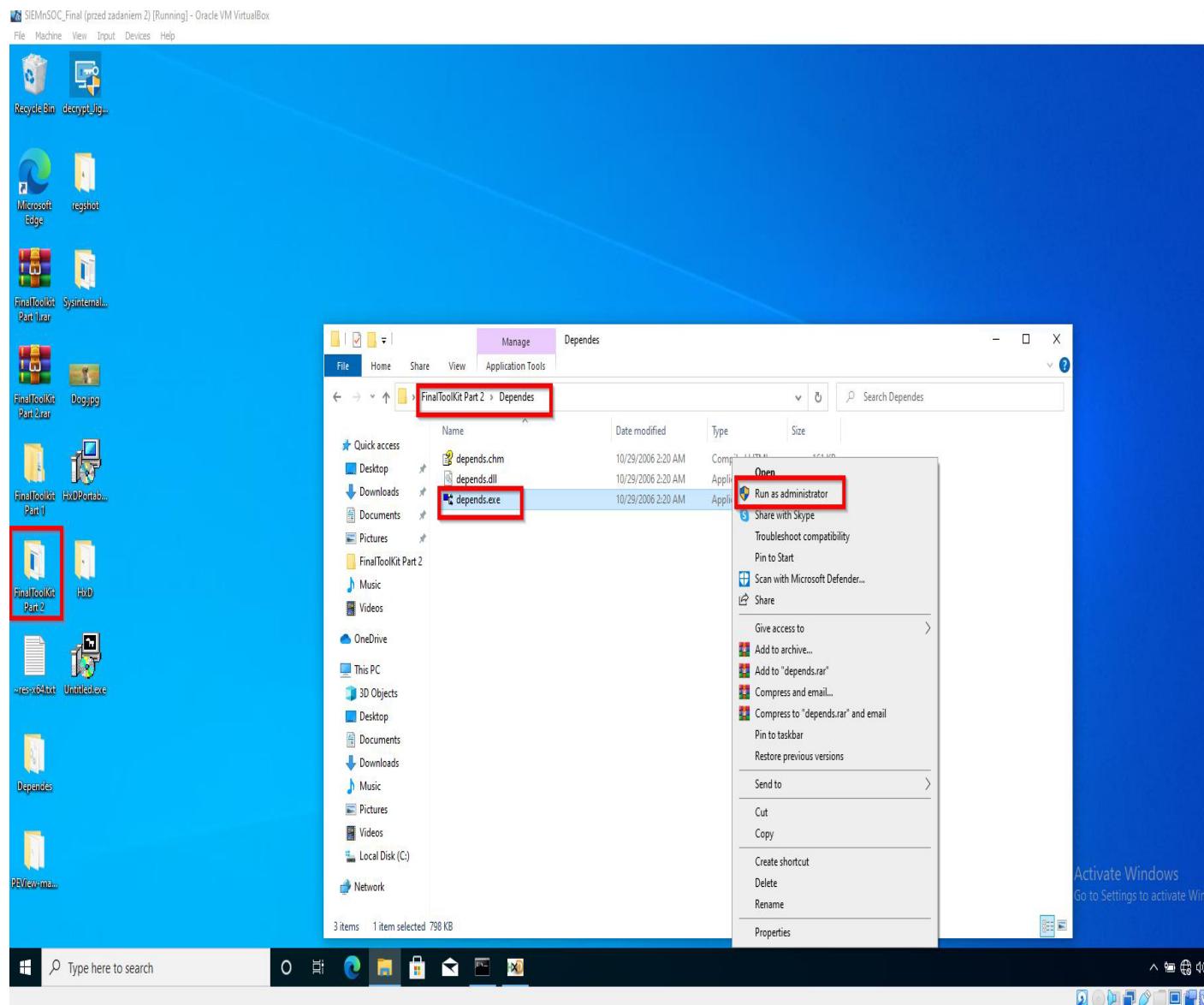
k)



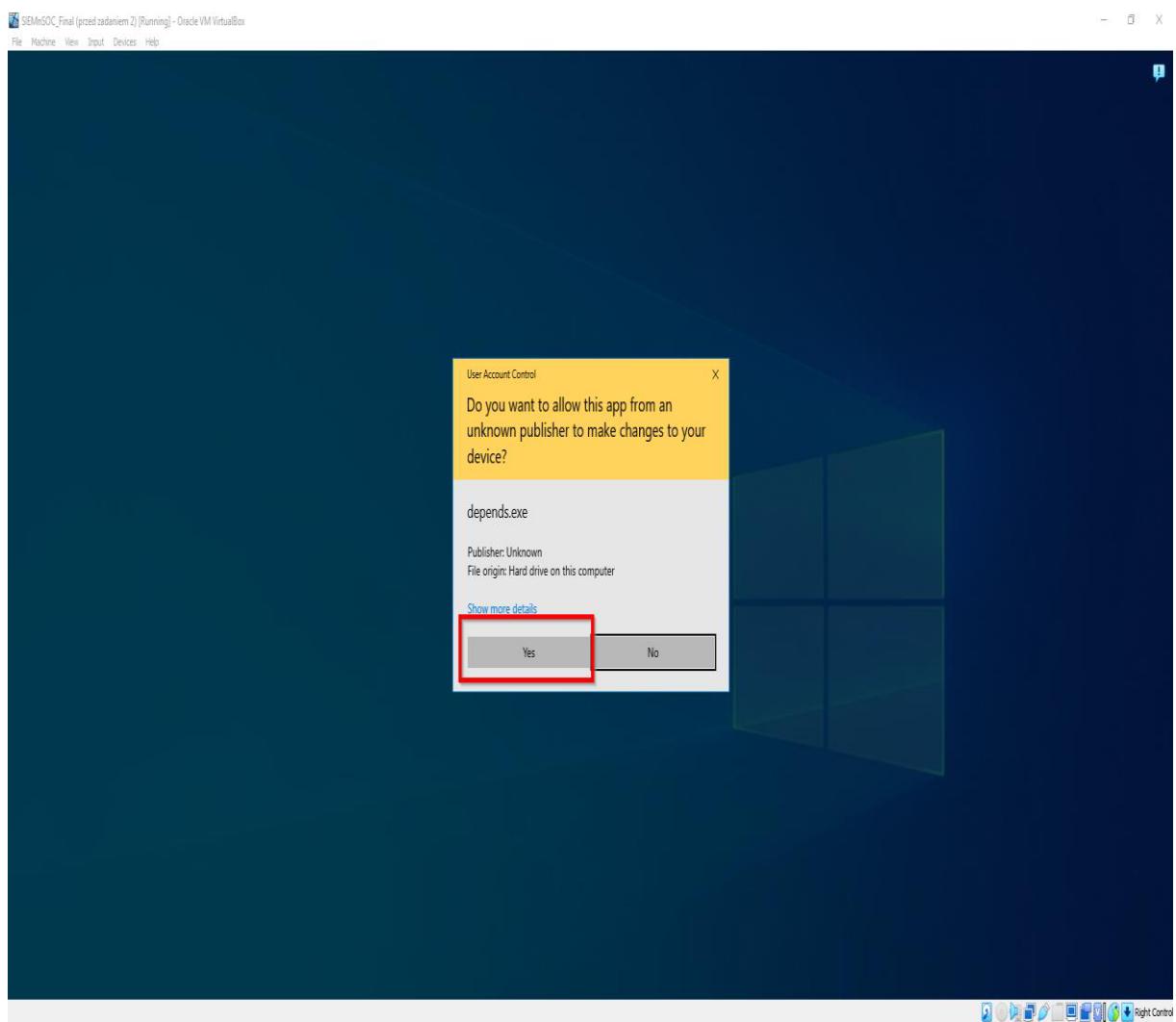
I)



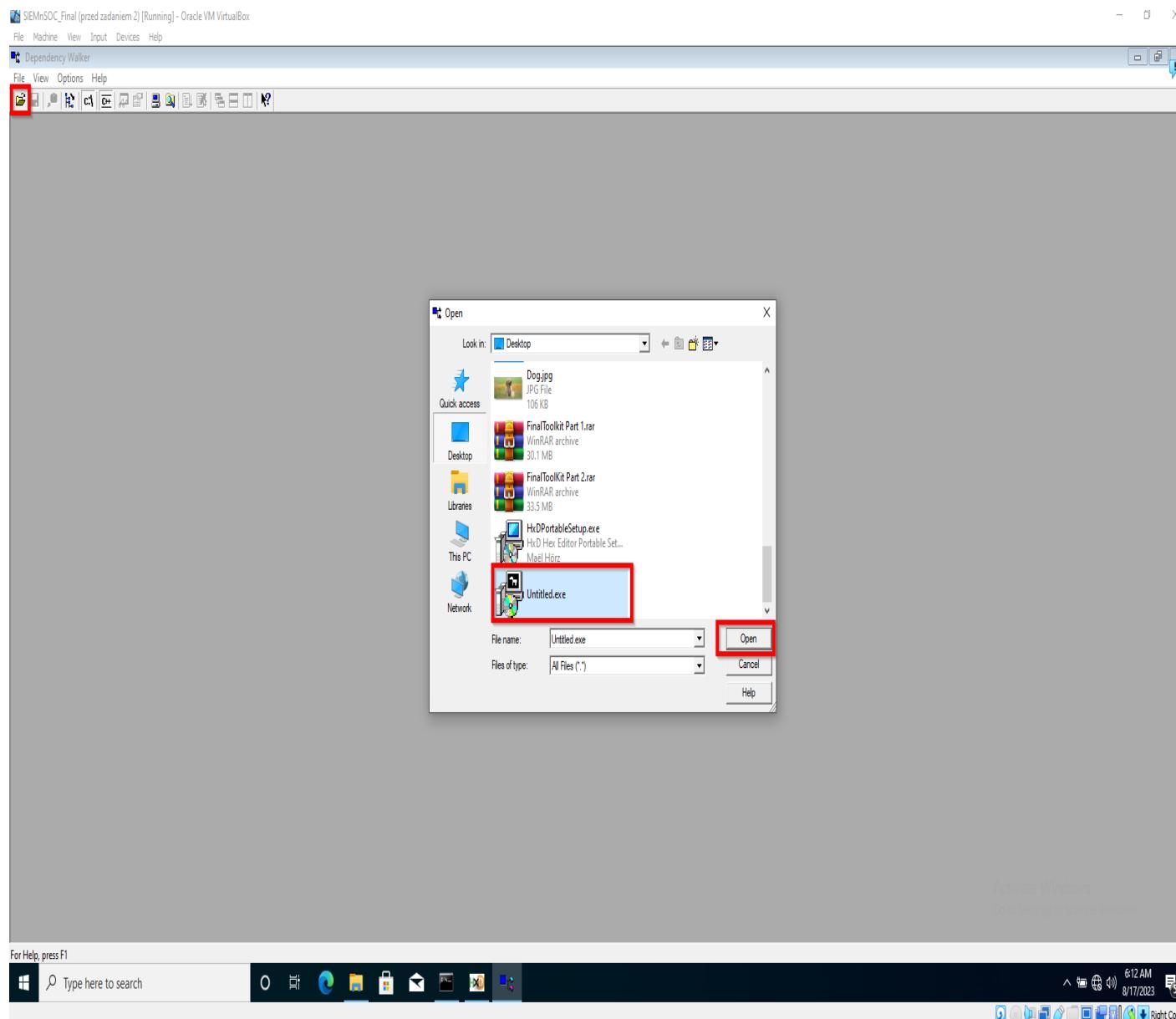
m)



n)



o)



p)

